THE NEON NEWS

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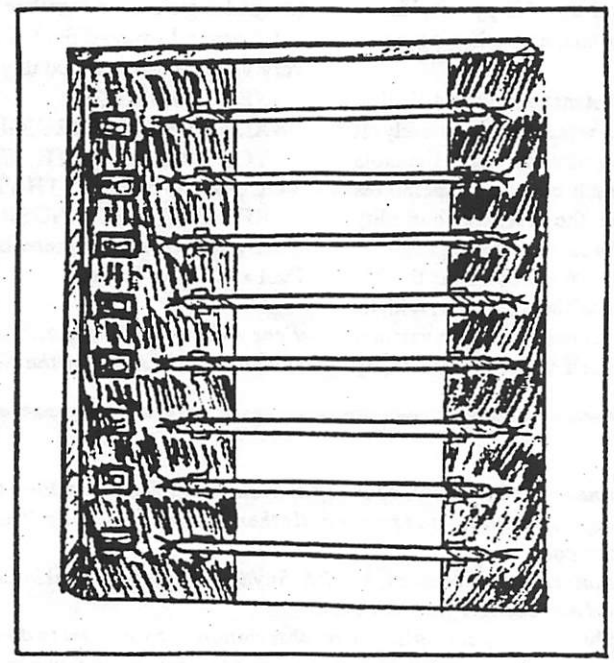
Color charts in black and white

A few years ago, I made a wall sculpture as a gift, selecting three colors that all looked good by themselves. The layers of the sculpture overlapped, mixing all the colors together, and when it was all done and lit up, the frank reaction of myself and others was, well, to want to puke. What had looked good in my mind's eye was nowhere to be seen in the finished piece, and I figured it was time to make a color chart that could be used to see how colors really interact with each other.

Many neon shops have a color chart of some sort, but I had yet to see one that did justice to the huge variety of available colors, and even more useful would be a color chart that can show different possible combinations and effects from projected and exposed light.



The typical layout for neon color charts has 10 or 15 straight tubes mounted together, all constantly on and immovable. The general effect is that yes, there are different colors, but they seem to run together into two main camps of greenish-blue and orangish-red.

Basic color theory tells you that when you look at a color, the way you percieve it depends on the colors around it. If you think this is only a subtlety, check out Joseph Albers' *Interaction of Color* as one good book. Orange on a white background can look like an orange-juice commercial but orange on black looks like Halloween. Red, yellow and orange almost cancel each other out, but put red next to green, yellow next to purple or orange next to blue and the colors come alive.

So the ideal color chart should let you view only the colors that you're interested in, and they should be easily interchangable, so that any two or three colors can be placed next to each other.

There should be a provision to see how the indirect light looks, without being blinded by the bright light.

And while you're at it, make it possible to slide different color background materials onto where that indirect light is shining, and have the whole thing be portable too.

"Oh, right," you say, "and the thing is nuclear-powered as well."

But it's really pretty simple to make -- and not at all expensive, using only a single transformer.

Richard Jenkins, a veteran designer of huge and complicated neon images, sees color charts as communication and sales aids to help customers who don't know beans about neon.

He wrote in European Sign magazine: "It's unbelieveable how many companies in the American sign business don't have a color chart to show their prospective customers. A customer who has a restaurant may learn that the pink he saw in a sign on a city street might be too bright or the wrong shade for his restaurant after seeing it up close on the sign company color chart."

Jenkins also marvels that with the possible range of colors -- and the potential for different lots of the "same" color to

(see Color chart, page 4)

Diffusion pumps: A personal view

By Renay Murray

It was one of those killer summers here in Tampa, Florida. Average daily temperature was 95. Average neon department temperature 101, in front of a fan. Humidity 100%. What a sweatshop!

It was during this steamy season that I was taxed as the senior journeyman tubebender with three trainees...yes, three! You guessed it. My company believed in that old theory of burning the torch at both ends -- bend the glass and train the men. Well, as anyone experienced could imagine, it was hard, very hard. To make matters worse, I was the only female. I felt like a den mother. Day after day of them saying "It's impossible. It's impossible. I can't do it" turned to "Thank you. Thank you. You got me through."

And then I saw it, our little diffusion baby. Blown to smithereens, absolutely crystalline -- what was left of it.

I had just successfully led my "boys" through a training extravaganza with novial glass. We managed to get through the job with just enough pride left to continue training endeavors. We had a job coming up, a relatively small one, just 30 units, but it was cold cathode. I had never done any of this type before. As any good teacher would do -- out came the books. Anything I could get my hands on regarding cold cathode. "Study up," I said as I handed out addresses of where the ever-popular (and slightly outdated and definitely overpriced) Neon Techniques and Handling book could be found.

After all my research, I discovered that I needed to install a diffusion pump on our manifold in order to properly process the units after they were made. It just so happened that we had one in our box of "things purchased but never installed." It was a crazy sort of hookah-pipe-gone-sci-fi-looking thing. All pyrex glass -- very expensive. And as usual, no instructions, no packaging, not a clue.

To my understanding it was most important to use the diffusion pump with cold cathode jobs or the units would burn out early. It works as a sort of "soft pump" removing moisture from the units before bombarding. The units had to reach certain temperatures within a very short time period. Therefore, the first stage humidity diffusion of the units allows these criteria to be met.

Well, we took on the whole thing as sort of a project. As the 25-millimeter glass came in we were busy installing our baby, with its little hot plate to heat the silicone fluid that creates a steam vacuum in the bottom cylinder. The glass work itself was fun. One of my guys was an ornamental glassblower trying to cross-train. He helped us devise the most successful method of close-stitching the 8-foot-long sections of glass and then welding on 19mm electrodes.

Within a week all the units were made and our little "puffer belly" diffusion pump was chug-chugging its way to success daily. Then it happened. In our haste to install our baby we chose not to wait for a graded seal to attach the pyrex diffusion pump to our lead glass manifold. We did the next best thing: jury-rigged it. We used rubber. That's right, rubber, that $16-a-foot stuff for high-vacuum pumps. With a couple of pinch clips and a little Lubriseal we were ready to go. Kinda like sticking silicone paste on a leaking manifold -- WA-LAH!!

I will never forget that day. Upon returning to work from a dental appointment, as I opened the back door there he was, the red-headed one, with a look on his face as if someone had died. "What is it, what is it?" I asked. "Sit down, sit down," they said.

And then I saw it, our little diffusion baby. Blown to smithereens, absolutely crystalline -- what was left of it.

From what I could figure, some of the Lubriseal grease had started to run down the cylinder, right smack onto the hot little puffer belly....and BANGO!! Thank god no one was hurt.

The boys are all gone now, on to bigger and better things I hope. I still keep that little diffusion pump close by my bench. We ended up hooking two vacuum pumps together to sort of superpump the cathode job. Everything worked well and it's been over a year now with no repairs. I truly miss my friends, my comrades and the escapades we shared together in glass.

However, I am confident of one thing. I know I taught them some very valuable lessons that day about neon work:

-NEVER RUSH IT

-ALWAYS USE THE RIGHT STUFF

-YOU WORK WITH FIRE, CHEMICALS AND HIGH VOLTAGE -- THINGS THAT CAN KILL YOU.

-RESPECT THE DANGERS; NEVER TAKE RISKS.

Guys, if you are out there, best of luck to you! (John Elliot, John Paul and David Hack)

Renay Murray, of Tampa, FL, has been bending glass for 17 years, and wrote this story for the Neon News.

Dear neon friends,

We're putting out this issue from a Minneapolis basement, courtesy of friend Dan, while spending time in Minnesota. Which means that recent letters to Hawaii may not have caught up with us, and phone calls there just ring and ring. The phone's answering machine will be back soon, in the event that you've tried to call.

In this issue we have several new contributors: Renay Murray, Mark A. Snyder and Richard Jenkins. Audie Foote's humor column returns, and so do Matt Thompson's cartoons, and more letters from all over.

With the next issue in July most subscribers can expect a plea for resubscription -- if you want to do it sooner, you can help us save paper. We can't afford to mail reminders, so if you original subscribers don't respond by September, you may not get the October issue! (Our other fall "issue" will be our baby, so if it's late, we're late, and there'll be induced labor all around.)

Thanks and aloha,

The Neon News is published quarterly by Val Crawford and Ted Pirsig, P.O. Box 668, Volcano, Hawaii, 96785. (808) 967-7648. Subscriptions are $15/year. No advertising (other than classifieds, at $.25 per word) is accepted.

The Neon News welcomes stories, artwork, ideas, letters, suggestions, irate comments and anything else you can think of. The editors make no pretense to be experts in the field; the newsletter is intended as a forum where neon folks can exchange ideas and information.

Diffusion pumps: A scientific view

By Mark A. Snyder

Your question as to what the differences are between an "aspirator" and a "diffusion pump" has been asked by many neon people. You are correct that on page 151 of Neon Techniques and Handling it states that "aspirator, diffusion pump and condensation pump" are different names for the same piece of equipment. Unfortunately for the neon industry, Neon Techniques and Handling has never been sufficiently updated in the last 20 years or so. For example, it does not include greaseless stopcocks, which have been used in analytical science for the past 25 years or so. However, the book does provide some good basic information on vacuum technology -- though somewhat outdated.

To answer your question will involve some explanation.

"Diffusion pumps" were first concieved and constructed in 1915 and 1916 by W. Gaede (Germany) and I. Langmuir (USA) respectively. They used mercury as a motive fluid, and were generally called "condensation pumps."

In the late 1920s, C.R. Burch of England and K.C. Hickman of the USA started using oils with high molecular weight and low vapor pressures instead of mercury. Butyl phthalate was one of the first oils used. Advancement of oil(s) technology lead to use of Octoil and Octoil S. These oils (for the time period) were superior to butyl phthalate. But after repeated exposure to atmosphere these oils would readily oxidize and require frequent replacement.

Editors' note: Having never worked in a shop with a diffusion pump, I've been mighty curious to know more about them, and so I ask a lot of nosy questions whenever the issue comes up.

Frank Cortese Sr. (of EGL) told me that you don't want diffusion pumps to be "on" (pumping down) all the time, and also that they require a lot of maintenance.

Supplier Monte Coon of Tulsa, OK, says succinctly, "They're as useful as tits on a boar."

A lab-ware glassblower told me of a friend who was killed when one blew up and cut the man's jugular. Another glassblower laughed at that idea, said it's absurd.

Manufacturers claim that dual-stage mechanical vacuum pumps will reach an ultimate vacuum of .1 micron. Tom Fling of Eurocom Imports says, "Yeah, maybe after they've been on all day."

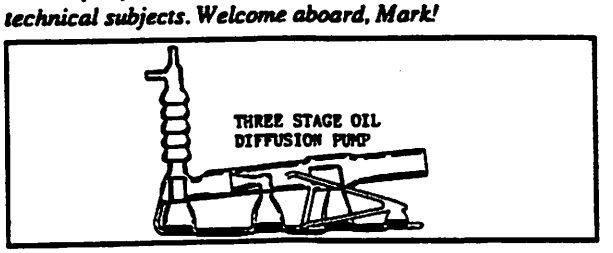
Various documents and individuals state that to make a good tube, a vacuum of .1 micron is needed. Others say that 3 to 5 microns is good enough. Everyone says that for cold cathode, you gotta get down to .1 micron

In case the numbers and the names of the numbers confuse you, a "micron" is 1/1000 of a millimeter. Millimeters refer to the height of displaced mercury at atmospheric pressure. A "torr" is the same as a millimeter, and so a millitorr is the same as a micron. The way the numbers are written is: 10^{-3}, 10^{-4}, etcetera. "10^{-3} torr" is the same as saying "1 micron," and "10^{-4} torr" is the same as ".1 micron." (A "millibar" scale refers to the atmospheric pressure divided by 1,000, and is the system commonly used in neon shops outside North America, as well as in science everywhere.)

Some diffusion pumps are glass with the heater outside and below it; others have the heating coil contained in its own glass compartment. Some are metal, many are two- and three-stage, some are air-cooled and some are water-cooled. Some use mercury, some use special oil.

The oil in a mechanical pump or in a diffusion pump puts vapors into the neon tube -- called "backstreaming" -- which is why a tube should not pump down any longer than it has to. This is one reason why turbomolecular vacuum pumps are said to be better -- there's no oil to contaminate the tube. They also have a higher ultimate vacuum, no maintenance, and a very steep price tag.

Despite collecting various bits of information like these, I'm still fairly confused about diffusion pumps. When I recieved the Precision Neon Laboratories catalogue (see page 10 of this issue) and read that "diffusion pumps should not be confused with 'aspirator' pumps," I wrote to the company for an explanation, since the Neon Techniques and Handling book states that they are the same thing. I recieved this from Mark A. Snyder, president and technical director of the company. He also offered to contribute other articles on technical subjects. Welcome aboard, Mark!



The use of these oils led to the term "diffusion pump."

Today's diffusion pump fluids are synthetic, usually made of phenyl siloxane compounds (silicones), and can be exposed to atmosphere without significant oxidation or reduction in pumping speed.

With the dramatic upswing of neon in the 1930s, it was evident from a quality standpoint that the neon fabricators needed a secondary vacuum pump to compliment their mechanical pump, as do today's fabricators. Why they did not simply adopt the diffusion pump already used by scientific industry is not exactly clear, unless it was simply from a cost standpoint -- which is often the case in our industry.

Instead, a "cheaper" design of the diffusion pump was adopted and designated the "aspirator." The basic principle of operation is the same, but major differences in performance are evident.

By comparison (see drawing), one should look at the actual physical dimensions of the two pumps to understand the differences and their effects on pumping performance.

Starting with the intake arm (A) (see drawings on page 10) the aspirator is usually 15mm tubing which restricts the free flight of gas molecules into the jet area. Under molecular flow conditions (10^{-3} torr or lower) the larger the diameter of the conduit, the farther the gas molecule can travel before hitting the conduit wall, hence, the better chance it has to enter the pump jet area and be pumped

(see page 10)

(Color Chart, from page 1)

ruin a job, "Colors are referred to (only) as red, pink, blue and green in many sign shops. No wonder there are so many mistakes!"

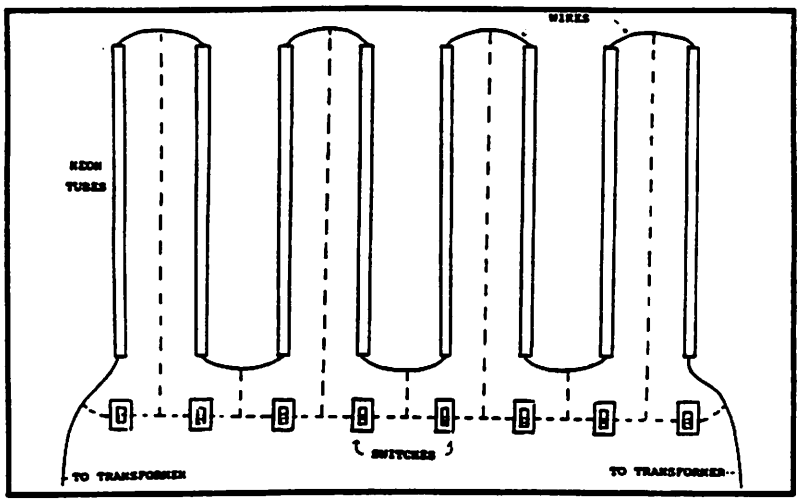
An alternative way to set up a color chart is this:

1) Make 12" tubes of every color, with the electrodes going straight at each end, and set up the board so tubes can be snapped in interchangeably. I label my tubes with a wrap of masking tape at each end, indicating not just the glass color, powder color and gas but the manufacturer too. There's quite a bit of difference between them!

2) Alligator clips are used to connect the tube at each end, so that the tube can be rotated easily. The tube supports are the plastic snap-in kind.

3) Give each position on the chart its own on/off switch (more about this below).

4) Paint out, tape or otherwise block-out the tubes on one side (half of their diameter), so they can be rotated in position to see what their projected or "halo light" looks like, without being blinded by the brighter direct light.



Wiring diagram for switches: solid lines indicate normal in-series wiring; dotted lines indicate additional wires for switches.

5) Design the chart so you can insert sheets of different background colors, to see the effects of the halo light on them.

This may sound difficult to build, but it isn't. The unit I have at home measures 16" by 24" and holds eight colors at a time. Each color-chart stick is a foot long including electrodes.

With such short tubes the voltage-drop across each one is relatively small and it's possible to use regular 90-cent household wall switches in the high-voltage circuit to bypass each tube, effectively acting as an on-off switch.

This is, of course, using the switches quite a bit over what they're rated for, and I wouldn't recommend this for any kind of regular, long-term installation. If a person wanted to do a code setup, a seperate transformer would be needed for each neon tube -- a great expense.

This color chart travels easily, but it's not attractive, what with exposed wires at each end and the electrodes visible. I'm working on another, more portable chart set into an old Samsonite suitcase -- something a little slicker for sales presentations.

But whether your color chart is big or small, the kind of information it will give you can be startling. When you mix colors from source-light all your grade-school tempera-paint lessons fall to the wayside. Want yellow? Mix green and red. Want a lot of surprises? Then check this out.

As a way of extending color possibilities, use bright projected or "halo" light behind, and a dim color viewed directly.

It can be really fun to fool around with.

We keep ours on our living room wall, and friends pull tubes out of the box to plug in and look at. I'll often keep certain combinations lit up for weeks, and it's amazing how some will grow on you.

Others get uglier by the day -- but it's a much easier way to find out which ones!

"Ne-argon": What a gas!

As one more way to expand your range of colors, use a mixture of neon with pure argon. Pure argon by itself produces the familiar dim purple. When just enough (but not too much!) neon is added, the intensity of the purple about doubles. When used in conjunction with powder-coated tubes, some very nice "interior" colors result.

Generally about 2mm of neon is put in first -- experiment with the actual quantity, as the volume of the manifold and the length of the tube will affect the outcome. Then the argon gas is added, to bring the tube up to the required level on the guage.

I've been making tubes this way for years, and they never "turn over" to the red neon color, if the proper purple color (and not a magenta-ish color) is obtained right away.

The aging-in period is quite long for these -- the gases are battling it out in there sometimes for a half-day or more.

The neon needs to be added first. Adding the argon first makes it take much longer to age in, and sometimes the color ends up the same as pure argon.

Bending the law: A neon crime story

Editors' note: If it appears that we stoop to sensationalism to fill a page, you're right. We'd love to reprint articles about the rumored "fly-by-night" neon school in Florida, or the Texas building whose new tubes stained so bad that it went to court. Send us your tarnished clippings!

This particular story is of personal interest to me, as "Ron Moore" is the guy whose job I took when I first did neon work in Hawaii. (Will the feds come and seize the torches? Is there anything stashed in these old boxes?)

In the last Neon News we mentioned this upcoming article, and I got a call from a man who wouldn't identify himself, but wanted to know who we were talking about. When I told him, he said "Oh, okay, I feel much better. I got in a little trouble a couple years ago, bad business deals, and I thought maybe you knew something I didn't know. My boss handed me the newsletter and said 'Take a look at this' and I got kinda worried." Which made me wonder -- anyone else out there a bit nervous? Looking over your shoulder? Here, then, is the tale of one neon miscreant, from The Denver Post, July 1987:

At 4:20 p.m. on May 31, 1981, Jim McGuire punched the time clock at the Purolator armored car company in Denver, where he worked as a money packager. According to the FBI, McGuire reported to work that day with a scheme that would make him rich.

Rich, yes. Happy, apparently not.

McGuire had gotten the job at Purolator just two months earlier. His bosses trusted him enough to allow private access to the vault and to millions of dollars in untraceable cash. At the end of his shift, precisely 1:06 a.m., McGuire was alone. He slammed the door on the vault and on his work-a-day world supporting a wife and two kids.

With a 12-hour jump on the police, Charles Allen Atkins, a 27-year-old Ohio native became a fugitive millionaire.

But for six years, while hundreds of FBI agents scouted the country for him, Atkins had them whipped. Finally last month, an agent's hunch paid off. On June 12, Atkins was arrested in Hawaii. Under a waterbed in his home, authorities seized some $200,000 in cash.

According to those who knew Atkins in Hawaii, his island life lacked one key ingredient: peace of mind. Probably to avoid suspicion, he found it necessary to hold a job. But he never held them long.

Adopting the name Ron Moore, Atkins had made a trip from California to Hawaii last August (1986). Hunting for work making neon signs, a trade he picked up in Florida <*Ed. note -- huh? from who?*>, he approached Honolulu sign shop owner Audie Foote.

Foote, a transplanted mainlander who jumped to Hawaii 20 years ago, counseled Atkins to forget about the islands.

"I've seen too many people come over here looking for paradise, and then two years later, they leave broke and disgusted," Foote said. However, should Atkins ignore his advice, Foote promised a job.

Within three days, Atkins moved his family from Santa Barbara to Honolulu.

"The guy mobilized faster than General Patton in Italy," Foote exclaimed. "I've got to admit, he really did impress me."

Foote recalled Atkins as a tall, gangly guy who hid a shrewd mind beneath a good-ol'-boy exterior. He didn't live flashy, choosing a 1985 Dodge Colt for transportation and a $925 townhouse on the windward side of the island for a home. The rent was cheap by Hawaiian standards.

Once, he boasted to Foote's nephew about owning a $42,000 telescope that he seldom used. It was one of the few hints that Atkins had money.

At first he worked hard. The neon business in Hawaii was prospering, allowing Atkins to earn between $15 and $20 an hour. He was a proficient neon bender, although Foote noticed immediately that Atkins had a stubborn streak.

"He had his own ways of bending neon, and he would launch into all kinds of technical and scientific explanations for why he was right. He refused to take any advice, including mine." Still, Foote tolerated Atkins because he was a reliable, likable guy.

"We spent a lot of time together, bending neon. We talked a lot," Foote said. "I mean, the guy could talk the ear off a deaf man."

After two weeks, Foote said, Atkins "started to get lazy." He sauntered off the job one day with no explanation. When he returned, he explained that withdrawal from alcohol was making him sick.

"I wanted to give the guy a break," Foote said. "If he had been single, I probably would have told him right then to take a hike. But he had his family over here." Foote gave him another chance, and a raise in hopes that Atkins would respond.

Atkins soon repeated his disappearing act, and soon exhausted Foote's patience.

"Finally, I wanted to wring the guy's neck, and I'm not a violent guy," Foote said. He fired Atkins, who demanded his paycheck immediately. He and his wife camped out in Foote's office until the $300 check was delivered.

If Atkins was constantly looking over his shoulder, he had reason. The life of a fugitive millionaire can have its downside. Even if FBI agents are stymied -- as they were in Atkins' case -- he couldn't have known that. Kill a man and local police will investigate until the next hot murder. Steal a fortune in federally insured cash, the FBI never forgets.

Atkins next went to work for Glenn Alexander, another sign shop owner. Alexander hired him as a subcontractor, but never was satisfied with Atkins's performance. He was moody and unreliable, Alexander said.

Months after he was fired by Foote, Atkins went back to apologize. A salt deficiency in his body, he told an incredulous Foote, had caused him to act irrationally. A doctor had made him well, and Atkins wanted his job back.

Foote declined. "I wished him good luck, but that was it." Foote noticed that Atkins had spent "several thousand dollars" getting his teeth restored.

The next time Foote heard about Atkins was three weeks ago, when Honolulu newspapers reported his arrest.

When Foote heard the news, he had trouble believing it. "You would never guess he was capable of doing something like that," Foote said. "But looking back, I guess it was obvious he was hiding something."

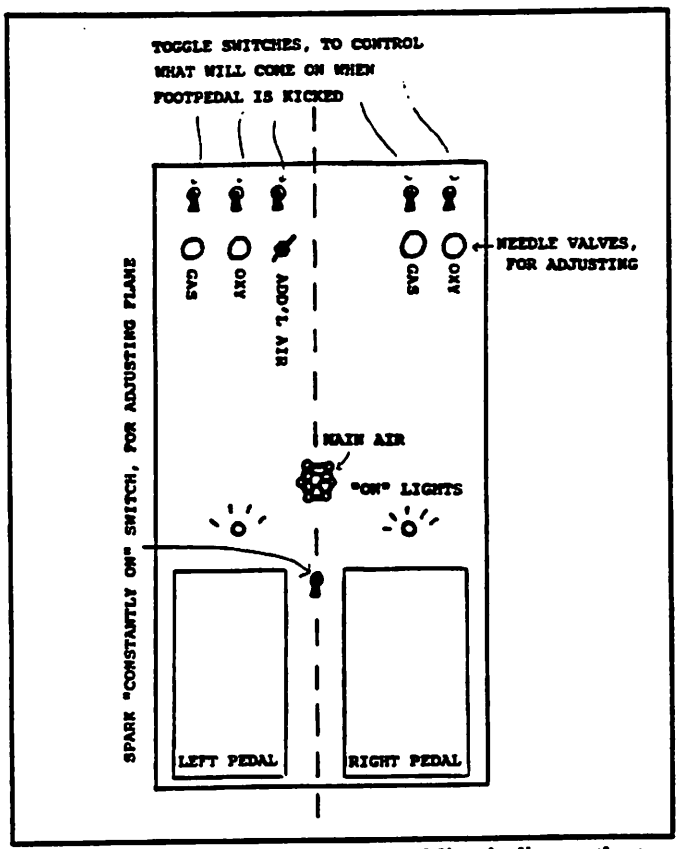
Follow-up note: Atkins pleaded guilty on two of four counts, and was sentenced in federal court to 13 years.

Torches, switches, bells and whistles

In the first issue of the Neon News there was an article about using footpedals for torch control. Setting up a new shop meant a chance to play with more ideas on the subject, and I have this to share:

--If you want OSHA to stay out of your hair, keep all footpedal voltages below 50 volts. This is easily done by using a step-down transformer with 24-volt output and then using 24-volt solenoid valves.

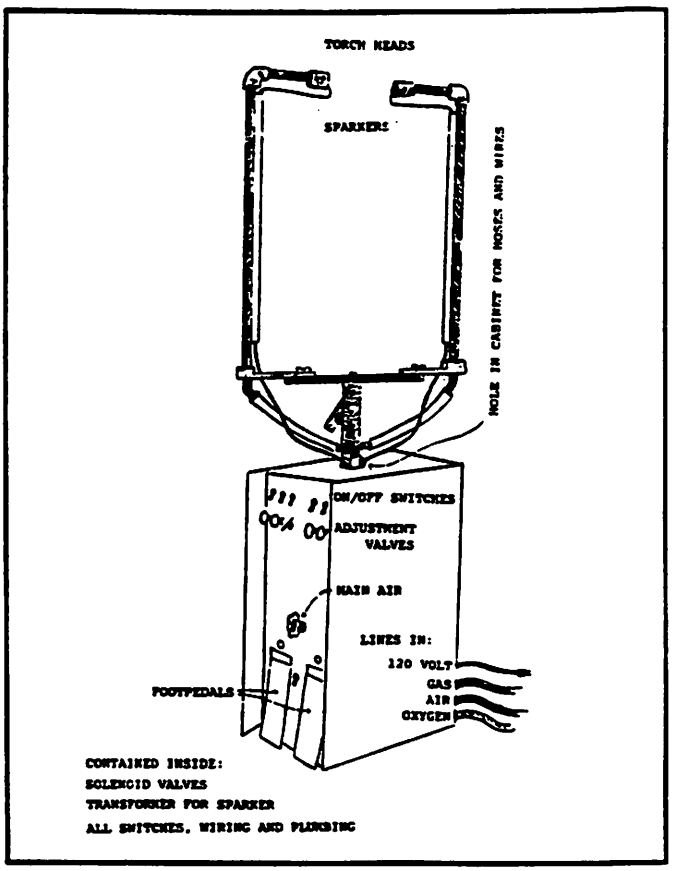
--A better footpedal arrangement can be set up with a steel plate mounted vertically on a hinge (see illustration). Both switches are then activated with one foot motion, as the plate hits both switches at once. One switch is on/off and controls the gas; the other is momentary-on and is for the spark. Since the plate is vertical less space is needed, and it's much harder



Control panel for torch: dotted line indicates the two "halves" of the unit, with left pedal controlling the valves and switches above, and likewise for the right pedal.

to accidentally trip over it or turn it on inadvertently. Also the switches last much longer, since they are never being kicked directly and the "stop" bolt keeps the plate from jamming into them.

--I was tired of always adjusting the flame for either "hot" or "cold" settings so I built a unit that has two complete sets of adjusting valves, solenoid valves and switches, and has two footpedals, one for each set. I housed it all in one cabinet with the torch heads on top, the footpedals and needle valves on the front and all the solenoid valves, plumbing and wiring enclosed inside. It works great!

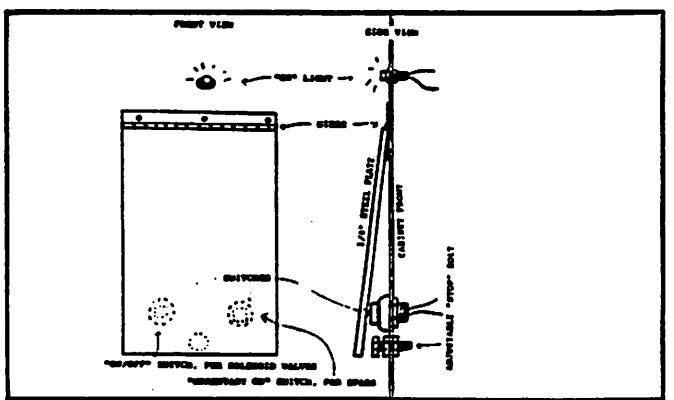


Typically it's set up so that by kicking the right pedal a "cold" flame comes on, which is good for welding. Weld on the electrode, and kick the right pedal off. Pause a moment, let the glass cool, then kick on the left side, which is set "hot" with more air, more gas and oxygen-boost too. Heat the glass, make the double-back and then kick it off.

The main air-adjusting valve is in the lower part of the cabinet, with a spark "on" switch to keep the spark going when making adjustments.

Above each footpedal is a light to indicate when the pedal's valves are turned on.

(see next page)



Two-in-one switch unit: One kick turns on the valves; the next kick turns them off. Spark comes on only when pedal is held in. "Stop" bolt is essential for long switch life.

Where do you look for new ideas?

By Richard J. Jenkins

At a recent seminar for which I was providing neon, a client in charge of the corporate presentation appeared in front of me and nervously announced: "If the neon is too bright, I want you to tear it down immediately! I don't want this sales meeting looking like it's being held inside some sleazy bar."

I was somewhat shocked by this statement. I stopped what I was doing and came down from my ladder; I quickly assured him that all the neon was on dimmers and he could dim the neon to whatever brightness he wanted. "Neon can be dimmed? I had no idea you can dim neon," he told me.

I hit the switch. "Wow!" was the verbal response. Everyone was amazed how well the neon enlivened the set! People came up to tell me they really liked the way the neon borders framed the projection screens, setting them apart from each other. And how the neon gave the set a whole new dimension and no longer made the set look so flat.

After the show, while I was taking down the neon, the same client ran up to me very excited and said: "What if we used neon for our conference being held in New York next year? What if we used neon in our training film that's going into production for the upcoming copier seminars? What if we used neon to brighten up the awards banquet and party next month?"

Could I help him do it with neon? "Sure," I said, and handed him my card.

I discovered something important: how people generally think of neon. I discovered that most people still think of neon as just something signs are made of, or sometimes still associate neon with some kind of seedy environment. Rarely do they think of neon as anything other than a way to advertise something in the form of words, logos, trademarks or borders around a window or running along the top of a building. In fact, many people within the sign industry still think of neon only as an advertising medium. This it does extremely well, but there's more to it than just signs.

The truth is: applications and uses for neon are endless. And the general public is not aware of the many ways neon can be used besides its traditional use as an advertising medium. Nor are they aware of the new technologies that are being used with neon, such as solid state flashers, dimmers and electronic transformers which are enabling neon to be used in many new and exciting ways and in new environments.

I kept thinking to myself how excited the client was and how he repeatedly said to himself: "What if we did this with neon?" and "What if we did that with neon?" I was witnessing him brainstorming for the first time about neon and how he could benefit by using neon in many new ways that would add a new and exciting dimension to his seminar work. He was excited by using neon in ways that I was already familiar with.

What's interesting about neon artists as a whole is the way they use neon in new and unusual ways. By combining neon with materials not traditionally used with neon, experimenting with technologies that were never intended for neon in environments not normally associated with neon, artists are creating new products and markets for neon that previously didn't exist.

But the most amazing thing about most of the neon artists in the United States is that they rarely work within the neon industry. And yet these artists are transforming the way neon is viewed by the general public. Their works of neon art are being displayed in museums and hung on living room walls, and used in other ways that have nothing to do with signage. Artists are designing neon for films, concerts, the outside of skyscrapers and interiors of homes. And the public is responding to these ideas and applications most favorably.

I'm not suggesting that there is no creativity within the neon sign industry. There is, but much of the creativity is being spent on improving products that already exist. Do we really need another improved plastic tube support? We need to use neon in new ways that capture people's imaginations, resulting in new markets, and breaking neon out of its use only in signs.

"What if" are two of the most incredible words. When we ask ourselves these questions, our minds start to dream, wonder, think and ponder. Ideas pop into our heads, and then they turn into new products, services, industries, and new ways of doing things.

Why look at the work of neon artists? Because their unusual ways of using neon may just benefit you.

Editors' note: This article was condensed from a longer story which appeared in European Sign magazine. We apologize for samurai-editing it, but we can print only "the news that fits" in a one-ounce packet, for reasons of postal rates. (Reminds me of my favorite publication slogan, from a mental patients' newsletter: "All the fits that's news to print.")

(Torches, from previous page)

High above each footpedal are two needle valves, one each for gas and oxygen, and above them are toggle switches. There is a third needle valve and toggle switch for the left pedal, which controls additional blown air for that side, allowing a hotter flame.

The toggle switches control which features will be on when the footpedal is kicked on.

Any number of combinations are possible, especially by using both pedals at once. I anneal soda-lime glass by kicking on some extra gas on the right side, with a big and bushy yellow flame resulting. Then kick it off and go back to a regular bending flame on the left side.

There is one problem though -- where do you go from here? Val suggests a torch with a full workout machine built in, one to excercise on. "Why stop at just kicking the pedals? Surely you could incorporate a weight machine, and a ski machine..."

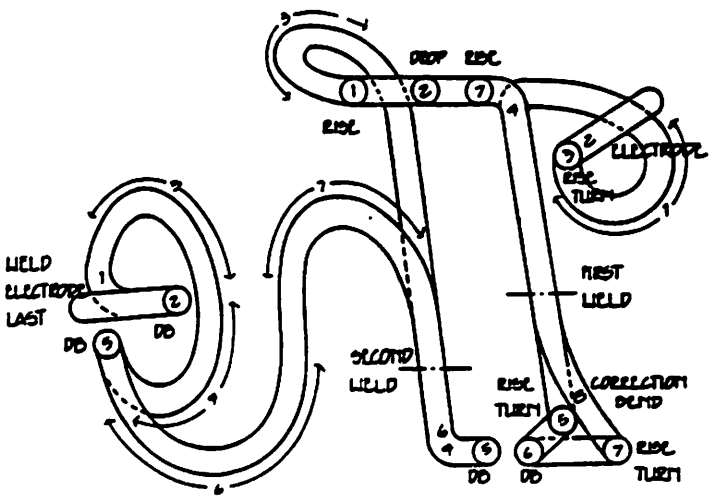
BOOK REVIEW
"Neon ABC: Alphabets by Dean Blazek"

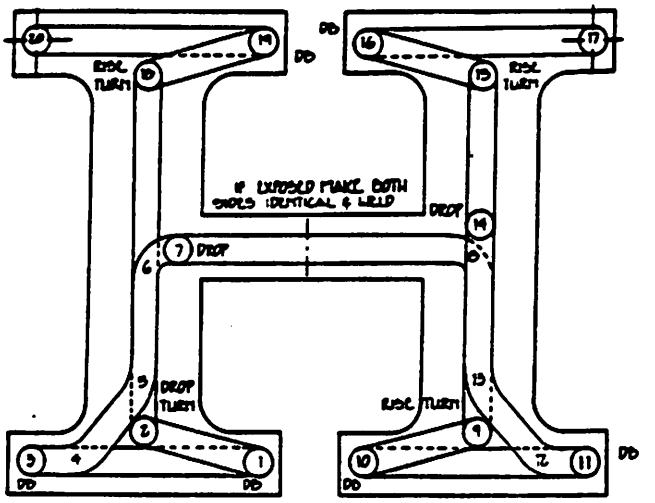
Book 1, Single Stroke and Double Stroke;
Book 2, Script Capitols and Lowercase;
Book 3, Roman Capitols, Roman Lowercase and Broadway

What Blazek has done is set down on paper the answers that a lot of beginning benders need, to questions like: What move do I make next? And how the hell am I ever going to make that little curve tucked way in there?

This set of three books is put together with a feeling of roominess. Each full page (in book 1, for example,) has one pattern; the opposite page is the reverse of that very pattern, giving both a "layout view" and a "bending view." This full-size layout makes details clear, but it probably contributed to the need for three seperate volumes, each with the hefty price of $35, or $98 for the set. The books are available either through Signs of the Times or directly from Blazek himself in Antigo, WI.

For benders with limited funds, I think the best book is Vol.2. Script is what gives most novice benders trouble, and in this book the bends are shown step-by-step. I wish I'd had this book when I was learning!



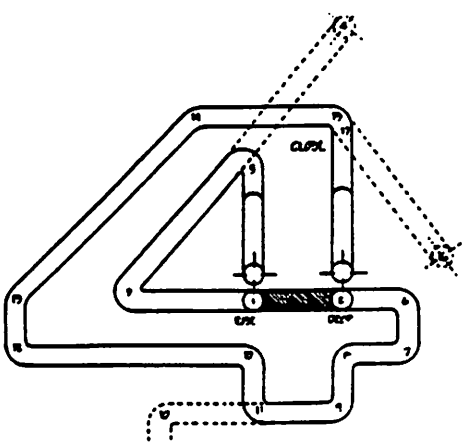


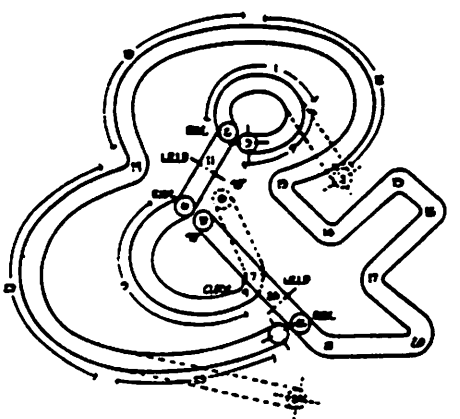
But beyond helping individuals, Blazek's books also offer some implicit suggestions on the industry-wide problem of non-standardized, confusing patterns.

As L.A. designer Richard Jenkins notes, "Everybody within the building industry understands the blueprints. Unfortunately, however, rarely does anybody understand what is or should be included on neon patterns or what they mean. Sometimes even people within the same company can't understand each other.

"Why? Because there has never been a neon pattern language that everyone agrees on. Everyone draws neon differently. A standardization of the symbols and language used on neon patterns would end a lot of the mistakes in the creation of neon glass throughout the sign industry."

Although these books do not give any instruction on pattern-making, they are clear and sensible as far as they go. Also, Blazek writes with plenty of authority on the subject, as he is the founder of the Northern Wisconsin Neon Workshop, Northern Advertising, Inc. and is the well-known former neon columnist for Signs of the Times.





LETTERS

Bad transformer, good scope

Duane Anderson (Val's uncle, the electrical engineer who researched powerline transformers for us) wrote to add a few things:

"Is the powerline transformer subject over? If not, a couple questions need to be asked. Like, did you make the measurements with the scope with an open circuit or a tube load? If open circuit, clearly the transformer is bad or the scope is way off calibration.

"My MIT (Mass. Institute of Technology) friend says that the analytical approach to determine what happens to a gas discharge in air is extremely complex, so you have to revert to an experimental method. Your use of an ignition scope is a great idea.

"Electrically, the issue is whether it is possible to get good enough control of secondary current by means of a choke in the primary. The commercial bombarder transformers have an inherent high impedance in the secondary to limit current.

"The reason volts times amps do not always equal power is because the volts and the amps may not occur simultaneously, and in AC circuits are related by the power factor. In complicated circuits like you are using you have to look at the instantaneous values and add 'em up."

***Editor's note:** The measurement was made with an open circuit, and the scope gave accurate readings when used on regular neon transformers, so I guess we can conclude that the big transformer is a dud. This points out a basic problem here -- underfunded research. Anyone with extra non-PCB transformers out there feel free to wing them my way, and this research will continue.*

City gas gives him a pain

Our faithful (yet still anonymous) writer from last issue wrote again, this time about city gas pressure and to offer several more good sources:

"I am always amazed at the ignorance of sign shop owners who operate a glass room and don't understand the first thing about the importance of adequate natural gas / city gas pressure required for correct operation of the different glass fires. I've been in shops that have:

"--gas company gas meters that are flow rated at less than combined burner consumption requirements,

"--unregulated gas meters,

"--a glass room supply line shared with every shop furnace, which when cycling off and on cause a loss of burner flame.

"I can't tell you in words how angry this makes me and -- oh yes-- it's the bender who gets blamed because the glass is blackened at bends, or the cool fires result in stress cracks and slow production, or there's poor ribbon work, on and on.

"I've done some research. A very informative article was published in Signs of the Times, April 1987, by Dean Blazek. It gives fuel/air requirements for burners used in the neon trade.

"In determining if a fuel problem exists and figuring out how to solve it, I contacted the city gas company and discovered they are very knowledgeable about the special needs of a neon shop. A gas guage, used to check line pressures at different points by almost all major gas companies, was demonstrated to me and I have since purchased my own from Dwyer Instruments ((219) 879-8000 with sales offices around the nation) for $30. It's a Model No. 1227, Dual Range, "U" type manometer using a red indicating fluid of .826 specific gravity.

"At one location I learned that if you can prove your glass room is your major source of income your gas company will install at no cost to you a replacement (larger) meter, and a regulator booster pump as long as it's outside of your building.

"My "U" guage is installed so I can watch it during bending, and it removes a lot of guesswork with burner adjustment. It can be very convincing for showing the boss just how difficult bending can be, with continous pressure changes from 4" to 7" (water column) throughout the day.

"A related item: I use a 0-5 lb. air pressure guage connected directly to the air manifold, and when used in conjunction with the gas "U" guage all burners can be kept operating at maximum performance. The guage is available from Carlisle Machine Works, item # 25A005, description #G22702. Ask for the description because different variations of same are offered.

"Another good source of supplies is Fisher Scientific, an international company listed in your yellow pages. They offer hundreds of items useful to the tube bender."

Backwards, out of phase

One anonymous caller described how he'd used two 30-volt, 30-amp transformers run backwards and out-of-phase (from each other) to create a "saturable-type reactor" (a type of choke vaguely described in the last Neon News). This setup also uses a 10-amp variac, with its output voltage converted to DC (via a simple rectifier), to power the "control windings" of the setup. He said he'd try and put together a diagram plus more specs on the unit for the Neon News.

More good stuff

Morgan Crook, of Neon Design, Columbia, SC, writes:

"Enclosed is a catalogue that I thought you might find interesting. Everything I have seen has been very good quality. Check out the pyrex/steel breaker bars."

And Morgan also asks "Does anyone have info / tips on good reliable single-ended drivers and RF units?"

The catalogue is by Precision Neon Laboratories, 2615 Fish Hatchery Lane, West Columbia, SC 29169. Phone (803) 794-5974. This company lists "glass o-ring connectors, greaseless stopcocks, manifold systems, vacuum guages, diffusion pumps, related equipment, supplies and services" on its cover. *(This catalogue led us to Mark Snyder, whose diffusion pump article appears on page 3 of this issue. Thanks, Morgan!)*

(Diffusion, from page 3)

out. The diffusion pump on the other hand has a 32mm intake arm which allows a gas molecule to achieve higher velocity before hitting the conduit wall, which allows it to travel farther before doing so. Consequently the gas molecule has a much better chance of entering the jet area.

Area (B) is the diameter of the vapor jet. Again, the aspirator has a small diameter vapor jet (18mm) which can only produce a marginal amount of oil vapor and velocity. Remember that the more oil vapor that is produced and the higher the velocity, the more pumping that will occur. The diffusion pump has a 32mm diameter vapor jet. Hence, more vapor at a higher velocity.

Probably the most critical area (C) is the pump body that surrounds the top of the vapor jet. The pump body on the diffusion pump is a venturi design. The clearance between the inside of the pump body and the top edge of the vapor jet is extremely critical. This design provides maximum velocity of the oil vapor, which dramatically improves pumping speed, volume and ultimate vacuum.

The aspirators' pump body in the area of the vapor jet (C) is of no value to vapor velocity and consequently to pumping speed and ultimate vacuum. The body walls are straight with insignificant clearance to the vapor jet.

The cooling chambers (D) are another area that was shortchanged in the design of the aspirator. There are simply three large spheres that allow the oil to condense and immediately drain back into the boiler, not providing sufficient cooling. Without proper cooling it is necessary to use lower boiler temperatures which produce less vapor at lower velocities.

The diffusion pump incorporates five bell-shaped cooling chambers which allow the pump oil a reflux cooling action that improves cooling efficiency. The oil cools more before returning to the boiler. This in turn allows higher boiler temperatures to produce more vapor at higher velocities. More vapor and higher velocities also increase vapor fractionation to improve overall pumping.

With the dramatic upswing of neon in the 1930s, it was evident from a quality standpoint that the neon fabricators needed a secondary vacuum pump to compliment their mechanical pump, as do today's fabricators. Why they did not simply adopt the diffusion pump already used by scientific industry is not exactly clear, unless it was simply from a cost standpoint – which is often the case in our industry.

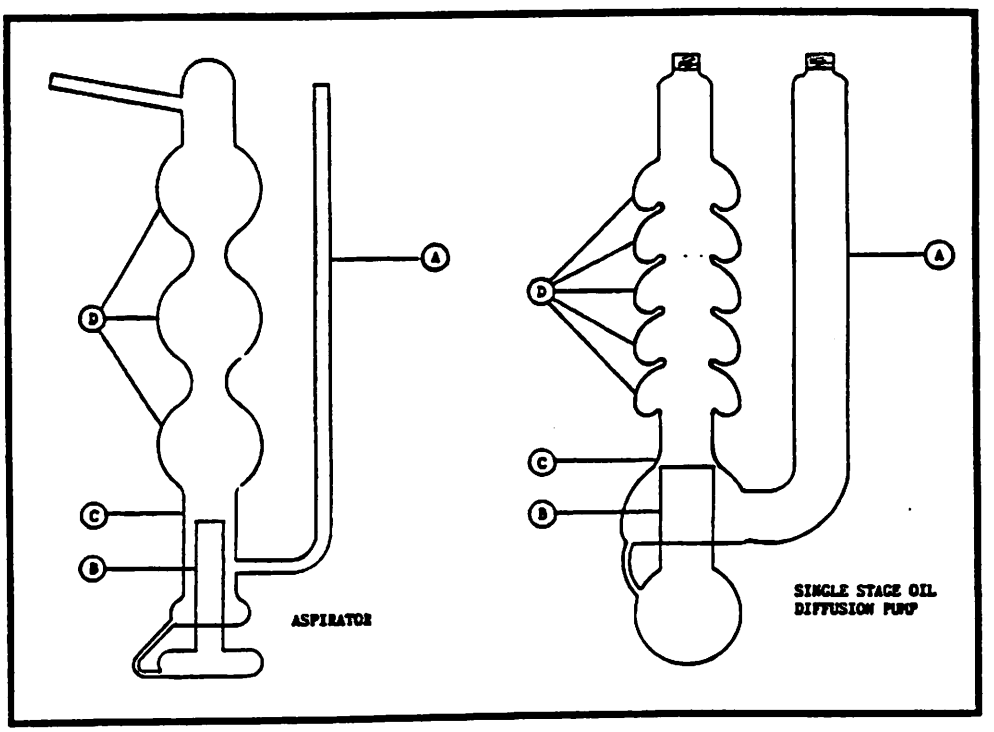
There are some minor points of consideration in design, but in light of the four basic design objectives they are insignificant for our purposes.

To summarize:

--The aspirator has a small intake conduit that restricts flow to the vapor jet; the vapor jet is too small to produce adequate oil vapor and velocity; the shape of the pump body does not enhance oil vapor velocity; and the cooling chambers do not provide efficient cooling of the oil vapor.

--The diffusion pump has a large intake conduit to enhance the free flight of gas molecules into the jet area; the vapor jet is large enough to produce adequate oil vapor and velocity for fast pumping; the venturi pump body in correlation with the vapor jet enhances vapor velocity and pumping speed, and the cooling chambers provide efficient cooling of the oil to utilize higher boiler temperatures, to further enhance oil vapor and velocity.

In brief, a diffusion pump is not an aspirator and vice versa. However, technically speaking, both pumps are "condensation pumps," as both heat oil to the boiling point and cool it to condense it. (hence condensation).



(see next page)

THE LIGHTER SIDE OF NEON

Is your glass all it's cracked up to be?

By Audie Foote

It was one of those bad days in the neon shop -- you know, when you're forced to make huge script letters out of 15mm colored glass hand-drawn in Lower Mongolia by retrained homeless sheepherders for upstanding American companies who have the nerve to call it "Clas-sick."

You know -- the stuff with the varying wall thickness that usually resembles the average soap bubble, or Saran Wrap? And when you try and heat it, it cracks in eighty or ninety places? Cracks which often run the full four feet? You know -- the stuff that can dull any file ever made, in two sliding, skidding, ridiculous strokes -- come on, you know what I'm talking about.

The ruby red letter that's sitting over there, that's just waiting to go PING! as soon as the room is quiet enough to enjoy the wonderful and uplifting sound of a cooling weld.

And then it dares you to pick it up and jump up and down on it while saying things that make you sound like a profane Elmer Fudd.

Oh? Am I the only one? Oh really? Maybe it's because I failed to anneal it properly in a vat of burning gasoline, as was once suggested by a visiting bender: "Works every time." He's dead now, of course, so I couldn't thank him for the valuable tip.

Then there was the genius on Staten Island who told me "You have to weld on two electrodes and hook it up to a live 15,000, 60-milliamp transformer before you bend it. This adjusts the ions before it cools so it won't crack." Flowers can be sent to him at New York General as soon as he regains conciousness.

Oh -- we musn't forget that in the unlikely event that you actually succeed in using this glass, you still have to remember to triple-pump it every seventeen minutes for two days or else it will never age in. All of this for the outstanding bargain price of $47 a stick, which will never be available when you're forced to order it anyway.

It comes with the following disclaimer: "Any resemblance between this junk and real glass is purely coincidental. Any questions or comments should be addressed to the manufacturer, who unfortunately does not understand English and hates all North Americans anyway. Thank you."

Yes, this includes all my favorites -- bromo blue, ruby red, novial gold -- which are such favorites with neon designers, like the one who specified 2,000 lineal feet of Voltarc classic blue, and decided later it was too dull, and could I install a device that would "dim it up?"

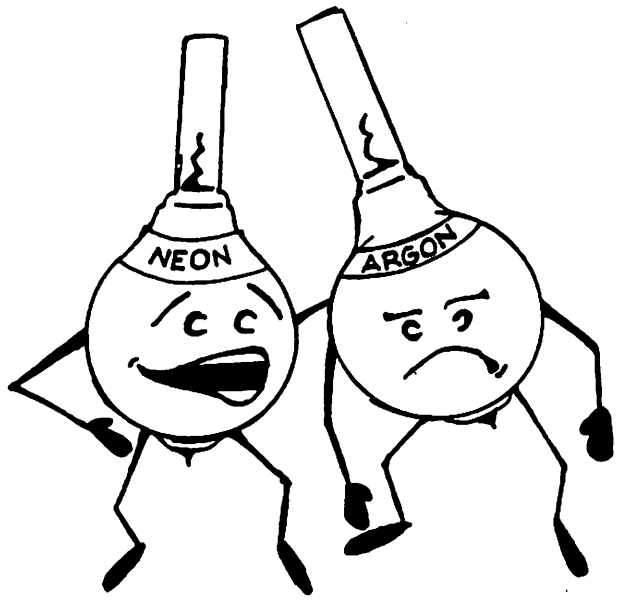
So I went to my car and got what was left of that gasoline I used to anneal it and, well, you get the idea. I can summarize my opinion of those classic glasses in three words I'm sure all of you benders out there can surely relate to: "WOUSY WOOBY WED!"

(from previous page)

Pumping speed of the aspirator has never been established to my knowledge. But ultimate vacuum is rated at 10^{-4} torr (0.1 micron) at best. In contrast, a single-stage oil diffusion pump is rated at 10 L/sec. with an ultimate vacuum of 10^{-5} torr (0.01 micron) or better, with vacuums sometimes reaching 10^{-6} torr under ideal conditions. A vacuum of 10^{-5} is 10 times better than 10^{-4}.

I should point out that page 151 of Neon Techniques and Handling shows a multi-stage diffusion pump and refers to it as a three-stage pump. It is actually a two-stage pump. The mistake is commonly made in thinking that the small boiler at the end of the pump is a third stage when in fact it is not. The "pre-boiler" is to promote oil vapor density for the first stage but is not considered a "stage" or "jet." A three-stage pump has four boilers (see drawing). Again, the small pre-boiler is not actually a stage or jet. The mistake made here is thinking that one has a "four-stage" pump -- which simply does not exist.

The many misconceptions and misinformation presented to the neon industry is alarming. I hope this information will at least clarify a point or two.



**What's the matter, Argon?
Are you feeling blue?!?**

BULLETIN BOARD

The Northern Wisconsin Neon Workshop will hold a 10-year reunion for all former students on August 17 and 18, 1990.

There will be a one-day seminar on pumping and a social gathering at the school in Antigo. There will be commercial work and artwork contests in which each student may submit three slides for each category. The work does not necessarily have to be designed by them, but it should have been bent and pumped by the person submitting the slides. There will be an award ceremony and a T-shirt and cap exchange.

Northern Wisconsin Neon Workshop will try to contact former students, but may not have all current addresses, so if you don't hear from them shortly, give them a call if you are interested in attending.

Rudi Stern has a new book due out "sometime before the end of the year," titled "Let There Be Neon II." (Now that there's been "Let There Be Neon" and "The New Let There Be Neon," how about "Let There Be A New Title"?)

We have word -- but no details -- of the "first world-wide neon conference" planned for Holland in September. We would love to hear from any of you who know more about it for the July issue, and would like as well to get some coverage of the conference for the Neon News.

One reader called saying that the Jerryco telephone number listed last issue was non-operational. Yes, they have a new number: (708) 475-8440.

Don Cook of Waipahu, Hawaii, wonders why the new solid-state transformers require 3mm less pressure inside the tube.

CLASSIFIED AD

NEON SIGN COLOR POSTCARDS: Buster Brown, Mobilgas Flying Horse, Simple Simon, etc. Fifty cards for $13.50. Davidson, 860 North 26th Street, Philadelphia, PA 19130. (215) 232-0478.

GALLERY NEWS

Susan Steinberg at Savage Neon (Savage, MD) notes the following gallery and annual show:

"Here's some neon news that won't be current (no pun intended) for the next issue, but I'm very proud to let you know about the annual neon show at Washington, DC's Zenith Gallery. Newspaper coverage printed a quote from me -- great advertising! This year's show is the ninth annual and is titled "Radiant Reflections." Yes, I have a piece in the show, along with neon artists Philip Hazard and Rocco Pinciotti and about 10 other local and far-out artists. Prices ranged from $500 to $12,000 or so. The show ran from January 19 through February 25. A slide show and lecture by Hazard and Pinciotti was presented in conjunction with the opening.

"Gallery Curator is Margery Goldberg. Zenith Gallery, 413 7th St. NW, Washington, DC 20004. (202) 783-2963."

***Editors' note:** It's too late to go see the show, but often show catalogs are still available, usually in the $10-$20 range, and are a good way to see what other folks are up to. Call or write the gallery for more info, and ask about future shows.*

The electric ray

THE NEON NEWS

THE NEON NEWS, P.O. BOX 668
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